AMENDED CLAIMS

1. (original) A diode pumped laser apparatus for generating a visible power beam, of the type comprising:
a linear miniaturized laser cavity (72) 5 comprising at least the following optical elements (30,33,36,10,20):

- reflecting means (30;33;36) that are highly reflective at a fundamental wavelength of a laser beam (52) generated by said cavities (72), at least one of said reflecting means (30) being traversed by a pumping beam (54), at least one of said reflecting means (36) being reflecting at said fundamental wavelength and a second harmonic wavelength (51) with respect to said fundamental wavelength and at least one of said reflecting means (33) being highly transmissive at said second harmonic (51) of said. fundamental wavelength;
- an active material (10) with polarized emission and with a gain configuration with small thermal aberration for the cavity mode, said active material (10) being able to generate said laser beam (52) at a fundamental wavelength;
- a non linear crystal (20), inside said cavity (72) ;

characterized in that:

said non linear crystal (20) is able to generate a second harmonic (51) of said fundamental wavelength by critical type I phase matching and that

said cavity (72) is associated to thermostating means (45;41;42;43;44) for temperature locking said cavity (72) and its optical elements (30,33,36,10,20).

2. (original) An apparatus as claimed in claim 1, characterized in that said cavity (72) and the optical means (30,33,36,10,20) which it comprises are selected to minimis optical losses.

3. (currently amended) An apparatus as claimed in ~~one of the previous claims~~ claim 1, characterized in that said optical losses at said fundamental wavelength are less than 2%.

4. (currently amended) An apparatus as claimed in ~~one of the previous claims~~ claim 1, characterized in that said optical losses at said fundamental wavelength due to thermal aberration are less than 1%.

5. (currently amended) An apparatus as claimed in ~~one of the claims from 1 through 4~~ claim 1, characterized in that the active material (10) is a crystal of Nd:GdVO4.

6. (currently amended) An apparatus as claimed in ~~one of the claims from 1 through 4~~ claim 1, characterized in that the active material (10) is a crystal of Nd:YLF.

7. (currently amended) An apparatus as claimed in ~~one of the claims from 1 through 4~~ claim 1, characterized in that the active material (10) is a crystal of Nd:YVO4.

8. (currently amended) An apparatus as claimed in ~~one of the claims from 5 through 7~~ claim 5, characterized in that the non linear crystal is LBO.

9. (currently amended) An apparatus as claimed in ~~one of the claims from 5 through 7~~ claim 5, characterized in that the non linear crystal is YCOB or GdCOB.

10. (currently amended) An apparatus as claimed in ~~one of the previous claims~~ claim 1, characterized in that said visible beam (51) is a beam at the limit of diffraction, or $TEM_{0,0}$.

11. (currently amended) An apparatus as claimed in ~~one of the previous claims~~ claim 1, characterized in that the pumping beam (54) is absorbed in two successive passes through the active material (10).

12. (currently amended) Apparatus as claimed in ~~one of the previous claims~~ claim 1, characterized in that said thermostating means (45;41;42;43;44) for temperature locking said cavity (72) and its optical elements comprise a mechanical structure (45;41;42;43;44) associated to said cavity (72).

13. (original) Apparatus as claimed in claim 12, characterized in that said mechanical structure comprise a structural base (45), and elements for supporting the optics (41;42;43;44).

14. (currently amended) Apparatus as claimed in claim 12 ~~or 13~~, characterized in that said structural base (45) and elements supporting the optics (41;42;43;44) are made of copper or other heat conducting material and associated in thermal contact with each other.

15. (currently amended) An apparatus as claimed in ~~one of the claims from 12 through 14~~ claim 12, characterized in that the temperature of the structural base (45) is regulated by means of an active system.

16. (currently amended) An apparatus as claimed in ~~one of the claims from 12 through 15~~ claim 12 characterized%: in that said mechanical structure (45;41;42;43;44) has the shape of a container, containing said cavity (72) in sealed way.

17. (currently amended) Apparatus as claimed in ~~one of the previous claims~~ claim 1, characterized in that said thermostating means (45;41;42;43;44) comprise an additional autonomous heat-regulating device to stabilize the temperature of

the non linear crystal (20) in autonomous and more precise way than the other elements of the cavity.

18. (currently amended) Apparatus as claimed in ~~at least one of the previous claims~~ claim 1, characterized in that the reflecting means (30;33;36) are at least in part obtained by means of reflecting depositions on the laser crystal (10) and/or on the non linear crystal (20).

19. (original) A method for generating a visible laser beam in a laser cavity (72) of the type whereby a non linear crystal (20) is inserted into said laser cavity (72) to obtain said visible laser beam (51) through a second harmonic generation operation, characterized in that it comprises the following operations:

- selecting a non linear crystal (20) cut for critical type I phase matching;
- aligning said non linear crystal (20) at a temperature predetermined by the thermostating means (45) associated to said cavity (72) obtaining the phase matching condition
- optimizing the conversion into second harmonic with additional small temperature adjustments around the predetermined value.

20. (original) Method as claimed in claim 19, characterized in that the temperature regulation operation occurs

in negative feedback, detecting the signal of a sensor positioned in proximity to the non linear crystal.

21. (currently amended) A method as claimed in claim 19 ~~or 20~~, characterized in that it further comprises the operations of:

- reducing the walk-off of the fundamental laser beam (52) operating on the dimension of the cavity mode inside the non linear crystal (20), in order to contain the walk-off angle inside the divergence of the beam;

- selecting the length of the non linear crystal as a function of the desired focussing.